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SACRAMENTO VALLEY
WATER QUALITY COALITION

Surface Water Quality Management Plan: Chlorpyrifos in Gilsizer Slough

prepared by

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1 Introduction and Background

The purpose of this Management Plan is to document the management practices implementation and performance goals and schedule to address agricultural causes of chlorpyrifos exceedances observed in Sacramento Valley Water Quality Coalition (Coalition) Irrigated Lands Regulatory Program (ILRP) monitoring in Gilsizer Slough. The elements included in this Management Plan conform to the Coalition's Waste Discharge Requirements (WDR), Order No. R5-2014-0030-R1, as issued under the ILRP. The need for performance goals related to chlorpyrifos was prompted by the four exceedances of the chlorpyrifos trigger limit collectively observed during 2014 and 2015 in Gilsizer Slough. The relevant conclusions established related to these observed exceedances are as follows:

- Agriculture was the probable source of the four observed exceedances based on the timing and methods of application and the typical timing of irrigation. Walnuts and prunes accounted for the majority of chlorpyrifos use in the drainage during the months in which exceedances were observed and should be the focus of additional management practice implementation.
- Based on California Department of Pesticide Regulation (CDPR) Pesticide Use Reporting (PUR) data from 2012 – 2014, non-agricultural applications of chlorpyrifos have not occurred in the drainage.
- Crop type, pesticide use, and management practice implementation survey results from the drainage need to be evaluated to determine the sufficiency of current management practice implementation and establish additional implementation goals, as necessary.

The Gilsizer Slough monitoring location (Gilsizer Slough at George Washington Blvd. (GILSL)) is currently represented by the Wadsworth Drainage in the Butte-Yuba-Sutter Subwatershed. However, the Gilsizer Slough drainage is not currently a representative monitoring site for the SVWQC. The GILSL monitoring location is currently used by the Coalition as a Management Plan monitoring location for the Irrigated Lands Regulatory Program (ILRP). The Gilsizer Slough drainage does not represent any drainages within the Butte-Yuba-Sutter Subwatershed.

The implementation goals presented in this document are intended to address and minimize chlorpyrifos discharges and exceedances due to agricultural uses of chlorpyrifos in the Gilsizer Slough drainage. The geographic scope and crops targeted for the implementation of these practices are summarized in **Table 1**.

Table 1: Summary of Scope of Management Plan Implementation

Management Plan Category (PRIORITY)	Registered Pesticides (HIGH)
Subwatershed	Butte-Yuba-Sutter
Representative Water Body	Gilsizer Slough
Represented Drainages	None
Analyte(s) of concern	Chlorpyrifos
Crops Identified in 2015 Farm Evaluation	Walnuts, Stone Fruit, Tomatoes, Orchard, Alfalfa, Wheat, Nursery Plants, Almonds (make up approximately 75% of the total irrigated acreage in the drainage)

1.1 CONSTITUENT OF CONCERN (COC)

Chlorpyrifos is a crystalline organophosphate insecticide and is the constituent of concern addressed in this Management Plan. Chlorpyrifos is categorized as a registered pesticide and is determined to have a high priority for development of management plan implementation and performance goals when its concentrations at Coalition monitoring sites are observed to exceed applicable water quality objectives (WQOs) or trigger limits. Chlorpyrifos has also been identified as a high priority constituent by the California Department of Pesticide Regulation (CDPR) and was classified as a state-restricted material[1] in 2015.

1.2 TRIGGER LIMITS

The Coalition's Order requires that Members comply with all adopted WQOs and established federal water quality criteria applicable to their discharges. The Order specifies the use of applicable numeric and narrative WQOs in the *Water Quality Control Plan for the Sacramento River and San Joaquin River Basins* (Basin Plan), and the criteria in USEPA's 1993 National Toxics Rule (NTR) and 2000 California Toxics Rule (CTR), which constitute numeric WQOs when combined with the Basin Plan's beneficial use designations. The numeric objectives from these sources are compiled in Table 5 of the Order's Monitoring and Reporting Program (MRP).

The Order's MRP establishes management plan trigger limits that are equivalent to the applicable Basin Plan numeric WQOs. The Coalition is required to prepare exceedance reports if surface water monitoring results show exceedances of adopted numeric WQOs or trigger limits that are based on interpretations of narrative WQOs. In locations where management plan trigger limits are exceeded, water quality management plans must be developed that will form the basis for reporting which steps have been taken by growers to achieve compliance with numeric and narrative WQOs.

[1] State-restricted materials are pesticides deemed to have a higher potential to cause harm to public health, farm workers, domestic animals, honeybees, the environment, wildlife, or other crops compared to other pesticides. Additional information available at: http://www.cdpr.ca.gov/docs/enforce/permitting.htm

The ILRP management plan trigger limit (a Basin Plan WQO) for chlorpyrifos is 0.015 µg/L. This concentration is the chronic (4-day average exposure) WQO included in the Basin Plan to protect aquatic life, wildlife, and humans. The Basin Plan also includes an acute (1-hour average exposure) WQO of 0.025 µg/L. The Coalition compares all of its chlorpyrifos monitoring data to both of these WQOs.

1.3 MANAGEMENT PLAN BOUNDARIES

As described above, the geographic boundaries of the Management Plan for Gilsizer Slough is simply the Gilsizer Slough drainage, as shown in **Figure 1**. This is because the Gilsizer Slough monitoring location is not a representative monitoring site for the SVWQC.

2 Physical Setting and Information

2.1 LAND USE CHARACTERIZATION AND BENEFICIAL USES

The boundaries, crop categories, and land uses within the Gilsizer Slough drainage considered by this Management Plan are shown in **Figure 2**. Land use data for the drainage were taken from the California Department of Water Resources (DWR) land use surveys and CDPR field use boundaries land use data. The boundaries and land use characteristics for the Gilsizer Slough drainage are also listed in **Table 2**.

Designated beneficial uses that are relevant to the implementation of the ILRP are municipal and domestic water supply (MUN), agricultural water supply (AGR), contact recreation (REC-1), and aquatic life uses including freshwater habitat, migration, and spawning for cold water and warm water species (WARM, COLD). Specific beneficial uses have been designated in the Central Valley Basin Plan only for the Sacramento River and direct perennial tributaries to the Sacramento River in this subwatershed.

Gilsizer Slough is tributary to the Sutter Bypass, a waterbody that is included in the Basin Plan's table of surface water bodies and designated beneficial uses (Table II-1). Beneficial uses for Gilsizer Slough are not specifically designated in the Basin Plan, but are assumed to be the same as those designated for the Sutter Bypass. The assumed beneficial uses for Gilsizer Slough are shown in **Table 3**.

Some tributaries to the Sacramento River in this subwatershed region that are listed in the Basin Plan (lower Butte Creek, Sutter Bypass) specifically did not receive a MUN beneficial use. Tributaries to these waterbodies and similar water bodies in the same drainages are expected to support similar uses. Based on these provisions of the Basin Plan and the uses specifically designated for the region, the water bodies in three undesignated represented drainages are assumed to support or have the potential to support AGR, REC-1, and WARM or COLD aquatic life beneficial uses at least seasonally, but not municipal and domestic supply (MUN) (see **Table 3**).

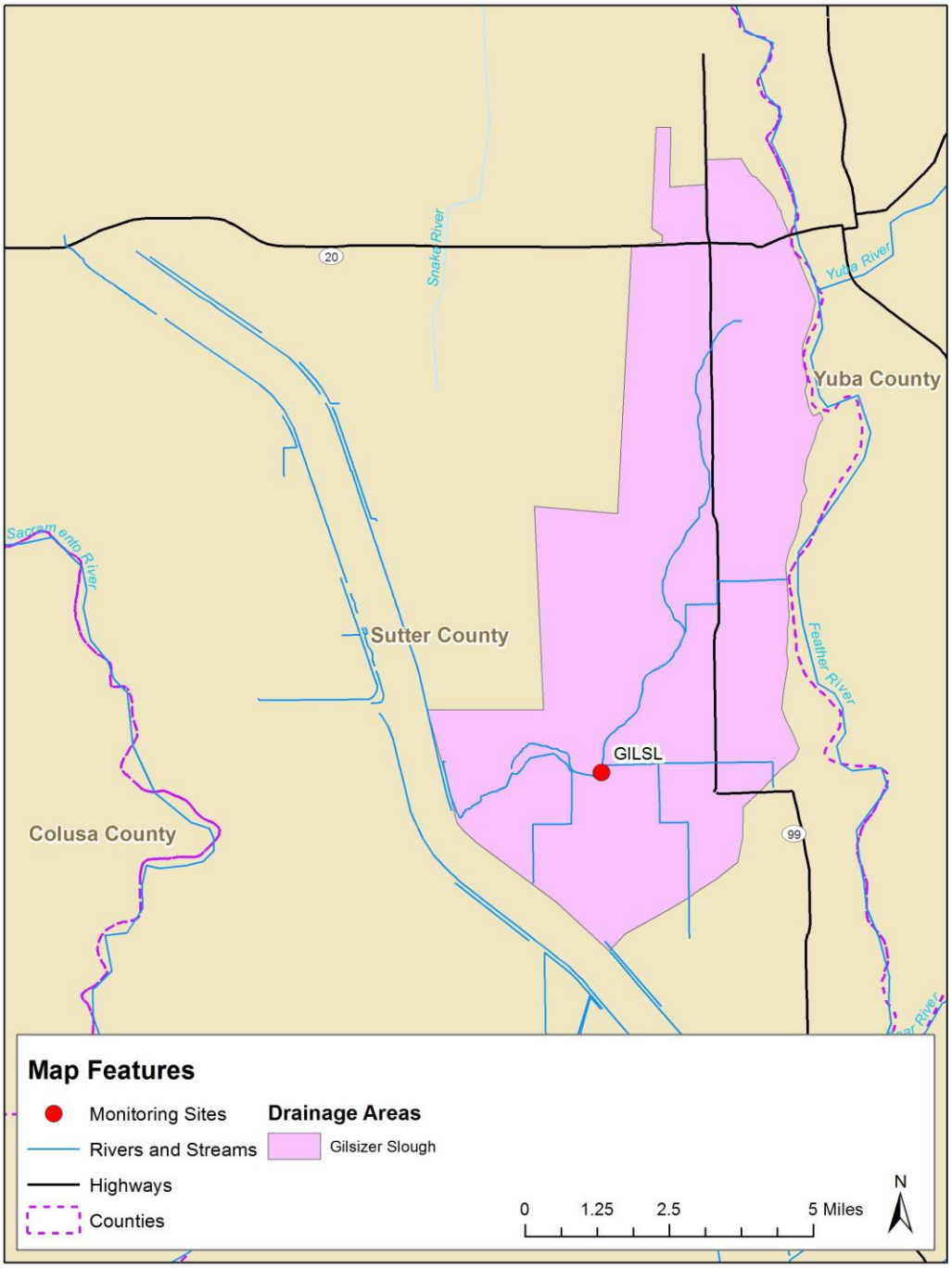


Figure 1: Management Plan Boundaries for the Gilsizer Slough Drainage.

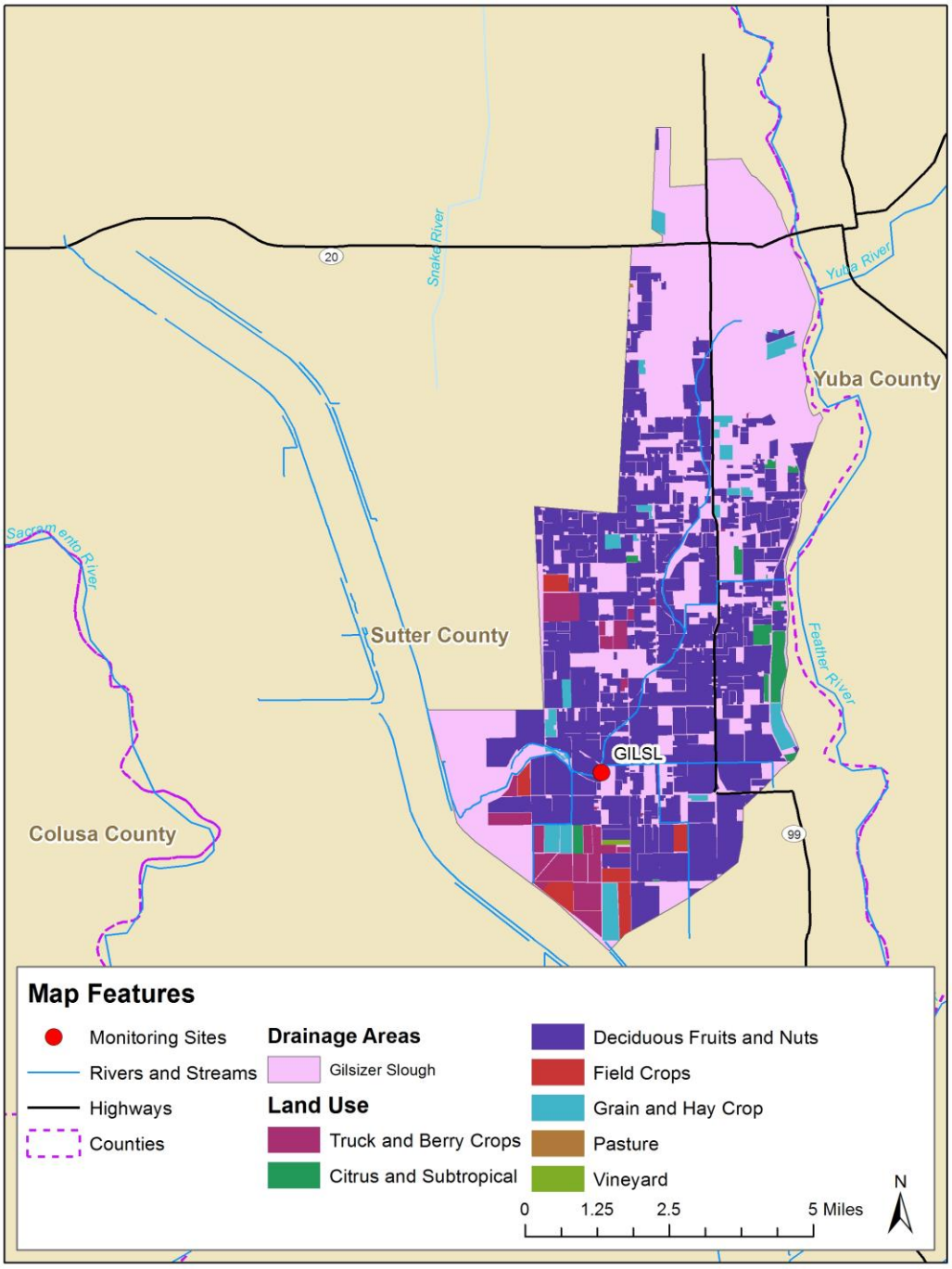


Figure 2: Land Use Characterization of the Gilsizer Slough Drainage.

Table 2: Land Use Characteristics for the Gilsizer Slough Drainage.

Drainage	Drainage Acres[(1)]	Irrigated Acres (non-rice)[(1)(2)]	% Irrigated Acres (non-rice)[(1)(2)]	Crop Types[(3)]
Gilsizer Slough	31,941	17,530	54.9	Walnuts, Stone Fruit, Tomatoes, Orchard, Alfalfa, Wheat, Nursery Plants, Almonds

1. California Department of Water Resources (DWR). 2013. Land Use Surveys by County. Vector data available at http://www.water.ca.gov/landwateruse/lusrvymain.cfm. Accessed September 2014.

2. California Department of Pesticide Regulation (DPR). 2013. Pesticide Use Reporting (PUR) Field Boundaries Land Use Data. GIS file. Accessed November 2013 by county from County Agricultural Commissioner.

3. Crop type information from 2015 Farm Evaluation Survey results.

2.2 CONSTITUENT OF CONCERN SOURCES, FATE, AND TRANSPORT

Pesticide application data (2012 – 2014) from the California Department of Pesticide Regulation (CDPR) describes the agricultural application of chlorpyrifos in the Gilsizer Slough drainage on alfalfa (March through August), almonds (typically June and July), outdoor transplants and propagules (July through September), prunes (January), and walnuts (typically May through September) for the control of insects. These application periods show peak chlorpyrifos application in the month of July, followed by August, September, June, with fewer applications in May, January, and March (see **Figure 1A** in **Appendix A**).

Table 3: Assumed Beneficial Uses Designated for Gilsizer Slough.

Beneficial Uses for Surface Water as Defined in Basin Plan	Gilsizer Slough
Municipal and Domestic Supply (MUN)	
Agricultural Supply: Irrigation (AGR)	AE
Agricultural Supply: Stock Watering (AGR)	
Water Contact Recreation: Contact Recreation (REC 1)	AE
Warm Freshwater Habitat (WARM)	AE
Cold Freshwater Habitat (COLD)	
Migration of Aquatic Organisms: Warm Water (MIGR)	
Migration of Aquatic Organisms: Cold Water (MIGR)	AE
Fish Spawning, Warm Water (SPWN)	
Fish Spawning, Cold Water (SPWN)	AE

Legend: AE = Assumed Existing Beneficial Use; these are existing beneficial uses designated for Sutter Bypass. Source: Water Quality Control Plan for the Sacramento River and San Joaquin River Basin, Fourth Edition, Revised April 2016 (CVRWQCB, 2016).

The crop receiving the greatest application of chlorpyrifos on a pounds (lbs.) applied basis is Walnuts, followed by outdoor transplants and propagules, almonds, and alfalfa (see **Figure A2** in **Appendix A**). The Coalition's 2015 Farm Evaluation Survey data show that walnuts, stone fruit (prunes), alfalfa, outdoor transplants and propagules, and almonds account for 55.8% of the total reported acreage in the Gilsizer Slough drainage. The remaining 44.2% of the acreage in the drainage is comprised of small acreages of 11 other crops, wetlands, and native vegetation. Information contained in 2012 – 2014 PURs shows no non-agricultural uses of chlorpyrifos in Sutter County during this time period (see **Figure A3** in **Appendix A**). PUR data collected from 2003 – 2014 show that acres treated with chlorpyrifos in the Gilsizer Slough drainage have varied over time. The annual variability in chlorpyrifos-treated acreage shows no discernable trend or pattern in the drainage over time (see **Figure A4** in **Appendix A**).

Chlorpyrifos has low solubility in water and partitions fairly strongly to organic compounds and particles. Due to these characteristics, chlorpyrifos is not transported readily in the dissolved form. However, chlorpyrifos is also a moderately persistent chemical – it breaks down by photolysis (half-life of 30 days) and hydrolysis (half-life of 25 days) and has an estimated typical field dissipation half-life of 21 days. Based on these characteristics, chlorpyrifos applications have a moderate potential to persist and be transported to surface waters in detectible concentrations up to two months after applications; although this risk is much greater within one month of application.

Based on potential transport pathways, effective best management practices (BMPs) that *could* be employed, and in many cases are already employed, by growers and applicators to reduce the risks of chlorpyrifos contamination in surface waters include:

- Using alternative pest control materials (i.e., using non-chlorpyrifos pesticides)
- Reducing the quantity of pesticides applied by monitoring pest and beneficial populations to determine need for pesticides and the best timing for maximum control
- Reducing the quantity of pesticides applied with spray buffers at field edges and near ditches
- Reducing drift by regular calibration of sprayers for pesticide applications
- Reducing drift by using electrostatic sprayer equipment
- Reducing drift by using effective drift control mechanisms
- Maximizing time between application and planned irrigation runoff and/or predicted storm runoff events in order to reduce loss of applied pesticides from foliage, transport on soils, and transport of pesticides dissolved in tailwater
- Changing to more efficient application methods (e.g., ground vs. aerial applications and/or equipment that provides more precise applications)
- Installation of vegetated filters between application areas and ditches and/or allowing vegetation to grow in drainage ditches to reduce movement of pesticides bound to soil particles and contamination from aerial overspray (Note: vegetated BMPs may be less effective for very fine-textured clay soils.)

- Reducing irrigation tail water through conversion from flood or furrow irrigation to buried drip, sprinkler, or micro-irrigation where applicable
- Reducing irrigation tailwater with tailwater return systems
- Reducing or delaying irrigation tailwater through irrigation water management

A diagram showing the general pathways for transport of agriculturally applied chlorpyrifos to surface waters and practices to minimize the risk of off-site chlorpyrifos transport is provided in **Appendix B**.

2.3 BASELINE PRACTICES INVENTORY

The Coalition's 2015 Farm Evaluation Survey data show that growers and applicators in the Gilsizer Slough drainage are currently implementing a suite of practices in the following two categories that contribute to preventing chlorpyrifos from entering surface waters: pesticide application practices and cultural practices to manage sediment and erosion. A baseline summary of practices by (1) practice category and (2) number of acres represented by an individual practice is provided in **Table 4**.

Table 4: Baseline Summary of Practices Implemented in the Gilsizer Slough Drainage to Prevent Chlorpyrifos from Entering Surface Waters.

PRACTICE CATEGORY / **Individual Practice**	**Acres Reported**	**Percent of Total Acres (12,507 acres)**
PESTICIDE APPPLICATION PRACTICES		
County permit followed	12,175	97.3
Monitor wind conditions	12,167	97.3
Avoid surface water when spraying	12,161	97.2
Attend trainings	12,054	96.4
Follow label restrictions	11,982	95.8
End of row shutoff when spraying	11,779	94.2
Use PCA recommendations	11,685	93.4
Monitor rain forecasts	11,376	91.0
Use appropriate buffer zones	9,968	79.7
Use drift control agents	9,660	77.2
Reapply rinsate to treated field	8,058	64.4
Sensitive areas mapped	5,783	46.2
Use vegetated drain ditches	4,698	37.6
Target sensing sprayer used	3,214	25.7
Chemigation	3,132	25.0

PRACTICE CATEGORY / **Individual Practice**	**Acres Reported**	**Percent of Total Acres (12,507 acres)**
Other1	307	2.5
No pesticides applied	135	1.1
Other2	15	0.1
CULTURAL PRACTICES TO MANAGE SEDIMENT AND EROSION		
Soil water penetration has been increased through the use of amendments, deep ripping and/or aeration.	8,301	66.4
Minimum tillage incorporated to minimize erosion	8,164	65.3
Cover crops or native vegetation are used to reduce erosion.	5,853	46.8
Vegetated ditches are used to remove sediment as well as water soluble pesticides, phosphate fertilizers and some forms of nitrogen.	5,269	42.1
Storm water is captured using field borders.	4,849	38.8
Crop rows are graded, directed and at a length that will optimize the use of rain and irrigation water.	4,295	34.3
Berms are constructed at low ends of fields to capture runoff and trap sediment.	4,116	32.9
No storm drainage due to field or soil conditions.	3,580	28.6
Vegetative filter strips and buffers are used to capture flows.	3,346	26.8
Subsurface pipelines are used to channel runoff water.	2,031	16.2
Hedgerows or trees are used to help stabilize soils and trap sediment movement.	1,436	11.5
Creek banks and stream banks have been stabilized.	1,405	11.2
Field is lower than surrounding terrain.	1,292	10.3
Sediment basins / holding ponds are used to settle out sediment and hydrophobic pesticides such as pyrethroids from irrigation and storm runoff.	1,111	8.9
Other	566	4.5
No Selection	216	1.7

2.4 CONSTITUENT OF CONCERN: WATER QUALITY DATA

The Coalition has observed four exceedances of the 0.015 µg/L WQO for chlorpyrifos in the Gilsizer Slough drainage since it began sampling in February 2006. The total number of sample events with exceedances for chlorpyrifos in the drainage is 4 out of 49 sample events. Chlorpyrifos exceedances observed in the Gilsizer Slough drainage from July 2014 through August 2015 are shown in **Table 5**. The most recent exceedance observed in August 2015 was likely caused by application of chlorpyrifos to Walnuts based on pesticide use reports. Chlorpyrifos use in the Gilsizer Slough drainage varies annually due to pest pressures and cultural conditions (rainfall, temperature, crop choices, etc.), but has generally exhibited a decreasing pattern from the peak use in 2008, as shown in **Figure 3**.

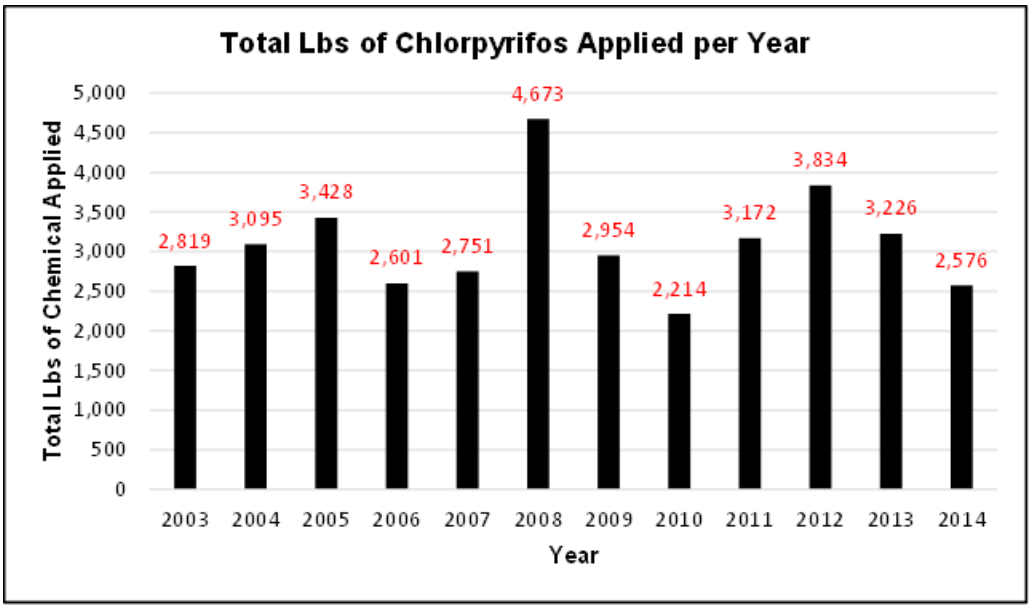


Figure 3: Chlorpyrifos Applications in the Gilsizer Slough Drainage, 2003 – 2014.

Table 5: Chlorpyrifos Exceedances Observed in the Gilsizer Slough Drainage: February 2006 – July 2016.

Site	Date	Event	Replicate	Analyte (µg/L)	Result
GILSL	07/15/2014	101	1	Chlorpyrifos - Unfiltered	0.091(1)
	01/20/2015	107	1		0.20(1)
	07/21/2015	113	1		0.0249
	08/18/2015	114	1		0.74(1)

1. Chlorpyrifos concentration exceeded both chronic (0.015 µg/L) and acute (0.025 µg/L) Basin Plan objectives.

3 Management Plan Strategy

Because chlorpyrifos is a registered pesticide that has been determined to have high potential for affecting aquatic life, high probability of direct agricultural use, and high probability for the successful implementation of management actions to control its discharge to surface waters, Coalition Members in the Gilsizer Slough drainage are required to implement a chlorpyrifos management strategy to reduce the risk of exceedances of the pesticide above its WQO and thus, help to improve surface water quality in the drainage.

3.1 MANAGEMENT PLAN APPROACH

The Subwatershed's approach to managing chlorpyrifos exceedances in the Gilsizer Slough drainage includes two elements. The first is to maintain the high degree of implementation of the management practices currently employed in the Gilsizer Slough drainage related to pesticide application and cultural practices to manage sediment and erosion. These are practices that are known to control or reduce the risk of discharges of chlorpyrifos to surface waters. Based on the results of the 2015 Farm Evaluation Survey, as summarized in the Baseline Practices Inventory provided in **Table** 4, nearly all growers in the drainage are already implementing the agricultural practices necessary to prevent discharges of chlorpyrifos to surface waters. The Subwatershed will continue to encourage Coalition Members in the Gilsizer Slough drainage to continue implementation of the practices summarized in **Table 4** under this Management Plan. The second element of the approach is to coordinate with the Sutter County Agricultural Commissioner's office to further educate growers and applicators about application requirements and recommended practices to reduce or prevent off-site discharges through implementation of required Restricted Material Permits for chlorpyrifos. All growers or applicators choosing to use chlorpyrifos will receive this information when interacting with Sutter County Agricultural Commissioner's staff with respect to chlorpyrifos use, and this interaction is expected to further increase implementation of effective practices by growers in the Gilsizer Slough drainage.

3.2 ACTIONS AND TASKS

In addition to continuation of the existing management practices implemented in the Gilsizer Slough drainage that are summarized in **Table 4**, Coalition Members in the drainage will look to the recent designation of chlorpyrifos as a California-restricted material to act as an additional mechanism for the education of growers and applicators seeking to apply the pesticide. Enhanced education regarding the appropriate techniques and conditions for application of chlorpyrifos, as described in CDPR's *Chlorpyrifos Interim Recommended Permit Conditions* (see **Appendix C**), is viewed as an effective means to minimize its discharge to surface waters and eliminate exceedances. On May 6, 2015, CDPR filed the final documentation to add chlorpyrifos to the list of state-restricted materials. This rule, which became effective on July 1, 2015, affects all products containing chlorpyrifos as an active ingredient (AI) when labeled for

production of an agricultural commodity. Chlorpyrifos, as a state-restricted material, is subject to the following restrictions:

- Chlorpyrifos can only be sold to, purchased by, possessed or used by, a person who holds a restricted material permit issued by the local County Agricultural Commissioner.
- Chlorpyrifos must be added to an applicator's restricted materials permit. The local County Agricultural Commissioner's office must be contacted to amend a restricted materials permit to include the use of chlorpyrifos.
- A Notice of Intent (NOI) must be submitted to the local County Agricultural Commissioner's office at least 24 hours prior to the use of chlorpyrifos.

Coalition Members in the Gilsizer Slough drainage are required to amend their restricted materials permits in order to legally apply chlorpyrifos and are required to provide NOI submittals to the Sutter County Agricultural Commissioner's office at least 24 hours prior to application of the pesticide. Additionally, the designation of chlorpyrifos as a state-restricted material puts in place the requirement for sellers, purchasers, and applicators of chlorpyrifos to possess a Restricted Material Permit for the pesticide. In order for an entity to legally purchase chlorpyrifos, the person must show proof of possession of a Restricted Material Permit for chlorpyrifos to a certified seller before the sale can occur. This requirement ensures that those legally obtaining chlorpyrifos have received information from the Sutter County Agricultural Commissioner's office on how to apply the pesticide in a manner that reduces or prevents off-site discharges to surface waters.

Growers and applicators adding chlorpyrifos to their restricted materials permits are provided with information on pesticide use permit conditions to minimize the risk of chlorpyrifos discharges and exceedances (see **Appendix C**). Each Restricted Material Permit applicant will be required to sign a permit conditions statement which demonstrates proof of receipt. The Sutter County Agricultural Commissioner's office maintains records of those who have applied for a Restricted Material Permit for chlorpyrifos, as well as those who have submitted a NOI to apply chlorpyrifos. Once a NOI is filed, the Sutter County Agricultural Commissioner's office is responsible for reviewing the NOI and informing the permittee of additional restrictions for the application of chlorpyrifos related to weather conditions, sensitive areas, etc., as necessary.

Additionally, the NOI process allows the Sutter County Agricultural Commissioner's office to perform a site inspection prior to a chlorpyrifos application (known as a "pre-site" inspection), if it determines one is warranted. The Sutter County Agricultural Commissioner's office maintains records describing such pre-site inspections. The tracking of educational outreach (via Grower Meetings) provided by the Sutter County Agricultural Commissioner's office can be used by the Subwatershed to assess chlorpyrifos education of Members associated with this Management Plan.

With reference to the existing level of management practices implementation (measured as a percent of total acres reported for a particular practice – see **Table 4**) identified by the 2015 Farm Evaluation survey, it is anticipated that Coalition Members in the Gilsizer

Slough drainage will increase the total acres protected by the following agricultural practices as a result of obtaining a Restricted Material Permit for chlorpyrifos and complying with CDPR's *Chlorpyrifos Interim Recommended Permit Conditions* (see **Appendix C**):

- End of row shutoff when spraying
- Use of mechanisms to control drift
- General drift minimization

End of row shutoff when spraying is a recommended practice for airblast applications of chlorpyrifos. Use of various mechanisms to control drift may also increase with implementation of good agricultural practices designed for "general drift minimization", which is a condition of CDPR's *Chlorpyrifos Interim Recommended Permit Conditions* (see **Appendix C**). General drift minimization practices due to physical changes in application techniques (e.g., control droplet size by selecting appropriate volume, pressure, number of nozzles, and nozzle type and orientation) are also expected to increase as a result of conditions included in the Restricted Material Permit for chlorpyrifos. Implementation of the above actions by Coalition Members in the Gilsizer Slough drainage are believed to be sufficient to minimize discharge of chlorpyrifos to surface waters and eliminate exceedances of chlorpyrifos WQOs.

3.2.1 Performance Goals

With the designation of chlorpyrifos as a state-restricted material, Coalition Members in the Gilsizer Slough drainage will be the recipients of additional educational outreach associated with Restricted Material Permit issuance and NOI submittals, and will be subject to the pesticide use permit conditions placed on chlorpyrifos that are anticipated to increase the level of implementation of three agricultural practices: end of row shutoff when spraying, use of mechanisms to control drift, and general drift minimization. The enhancement of these actions is expected to minimize the discharge of chlorpyrifos to surface waters and thus, achieve compliance with the Order's receiving water limitations for the pesticide. The effectiveness of these actions implemented by growers and applicators in the Gilsizer Slough drainage will be evaluated through review of Management Plan monitoring data, evaluation of future Farm Evaluation Survey results as compared to baseline results, and Subwatershed and Sutter County Agricultural Commissioner chlorpyrifos education activities. The Butte-Yuba-Sutter Subwatershed and Coalition Members in the Gilsizer Slough drainage seek to meet the six performance goals shown in **Table 6** as they relate to the application of chlorpyrifos.

Table 6: Management Practice Performance Goals for Chlorpyrifos Applications in the Gilsizer Slough Drainage.

Performance Goal	Mechanism of Achieving Goal	Quantitative Measure of Progress	Schedule for Achieving Goal
1. Chlorpyrifos applied by entity receiving pesticide use permit information from Sutter County Agricultural Commissioner's office.	Sutter County Agricultural Commissioner's office to provide applicators with pesticide use permit conditions for chlorpyrifos.	100% of pest control operators and pesticide use permittees will receive information on pesticide use permit conditions for chlorpyrifos. *Reporting Basis:* *Number of permittees that received pesticide use permit information.*	Ongoing: 100% achievement of this performance goal will occur in every year that chlorpyrifos is listed as a restricted material.
2. Increased education and awareness of end of row shutoff when spraying. 3. Increased education and awareness of mechanisms to control drift. 4. Increased education and awareness of drift minimization.	Butte-Yuba-Sutter Water Quality Coalition to provide two (2) Chlorpyrifos Management Plan Meetings per year that will include information to educate applicators on (1) end of row shutoff when spraying, (2) mechanisms to control drift, and (3) how to minimize drift through consideration of weather conditions when applying chlorpyrifos, as well as other relevant BMPs. Mailings and/or phone calls to growers regarding these topics will also be counted as successful completion of these goals.	Achievement of these performance goals will be measured based on attendance and/or receipt of outreach materials by those growers applying chlorpyrifos. Outreach activities to be documented in Annual Monitoring Report and tabulated in annual Management Plan Progress Report. *Reporting Basis:* *Meeting dates, number of attendees at meetings, and recipients of mailings and/or phone calls covering these management practice topics.*	Ongoing: 100% achievement of this performance goal will occur in every year from the date the Management Plan is submitted for approval to the Executive Officer.

Performance Goal	Mechanism of Achieving Goal	Quantitative Measure of Progress	Schedule for Achieving Goal
5. Increased implementation of effective management practices by growers applying chlorpyrifos.	Educate growers through outreach activities about management practices that are effective in reducing or preventing discharge of chlorpyrifos to surface waters.	Achievement of this performance goal will be measured by comparing and reporting management practices implemented and reported in the Farm Evaluations from the year prior to the initiation of Management Plan activities to the practices implemented under the Management Plan. Each grower (applying chlorpyrifos) should have at least one management practice implemented that is effective in reducing the potential for water quality issues related to chlorpyrifos. *Reporting Basis:* *Number of growers who applied chlorpyrifos, how many of them implemented management practices, and the total number of practices implemented.*	100% achievement of this performance goal will occur within three years from the date the Management Plan is submitted for approval to the Executive Officer.

Performance Goal	Mechanism of Achieving Goal	Quantitative Measure of Progress	Schedule for Achieving Goal
6. Reduction of chlorpyrifos concentrations in Gilsizer Slough at George Washington Blvd. to below trigger limit.	Educate applicators through outreach activities on how to reduce or prevent discharge of chlorpyrifos to surface waters.	Achievement of this performance goal will be measured through evaluation of the Coalition's chlorpyrifos data collected in Gilsizer Slough at George Washington Blvd. *Reporting Basis:* *All annual monitoring results, including exceedance reports, if applicable.*	100% compliance with the ILRP trigger limit within three years from the date the Management Plan is submitted for approval to the Executive Officer.

3.2.2 Member Education

Member education takes the forms of general outreach to all members of the Butte-Yuba-Sutter Subwatershed and more targeted outreach to Coalition Members in the Gilsizer Slough drainage. General outreach at the subwatershed level is directed to landowners, farm operators, and/or wetland managers regarding the cause(s) of exceedance(s) of the WQO for chlorpyrifos and the adoption of best management practices (BMPs) that prevent the movement of the pesticide into Sacramento Valley surface waters. These general outreach efforts are carried out through presentations at grower meetings or via direct mailings.

Targeted outreach has been directed to landowners/growers operating in high priority lands near Gilsizer Slough. Using a list of assessor parcel numbers, the Coalition identifies its members on these high priority lands and mails to them an advisory notice along with information on options to address chlorpyrifos exceedances using BMPs. During the 2014 and 2015 monitoring years, the Butte-Yuba-Sutter Water Quality Coalition (BYSWQC) provided the targeted outreach shown in **Table 7**.

The effectiveness of future Management Plan outreach efforts will be assessed by tracking the number of attendees at meetings as compared to the number invited, tracking management practice implementation related to pesticide application practices and cultural practices to manage sediment and erosion, and compliance with WQOs for Management Plan monitoring events.

Table 7: 2015 Butte-Yuba-Sutter Water Quality Coalition Targeted Educational Outreach Efforts Regarding Chlorpyrifos Exceedances and Associated Management Practices.

Date of Outreach/ Org Providing Outreach	Focus of Outreach	Location Where Outreach Conducted	# Attending Meeting/ # Successfully Contacted by Phone/ # on Mailing Distribution List	Outreach Type	Document Title(s) (if applicable)
05/15/2015 BYSWQC	Details re: chlorpyrifos exceedance, BMPs, general program updates	Member's homes – direct mailing	1617 on mailing distribution list	Article in Newsletter	Summer 2015 Newsletter
10/06/2015 BYSWQC	Details re: chlorpyrifos exceedance, BMPs, general program updates	Member's homes – email	544 on email distribution list	Article in Newsletter	Oct. 6, 2015 E-Newsletter
11/16/2015 BYSWQC	Specific details re: chlorpyrifos exceedance including triggering of Management Plan, BMPs	Select Member's homes – direct mailing	106 Members in Gilsizer Slough	Letter	Chlorpyrifos Exceedance Letter – Gilsizer Slough 2015
12/10/2015 BYSWQC, LWA, Sutter Co. Ag Dept. staff	Specific details re: chlorpyrifos exceedance including triggering of Management Plan, BMPs	Sutter County Ag Department, Yuba City	7 Members in attendance; prior to meeting, all 10 Members on PUR list were contacted via mail, then via phone, and 5 Members sent follow up emails. 3 Members not in attendance were sent meeting materials via mail.	Meeting	Chlorpyrifos Management Plan Meeting Invitation Gilsizer Slough Chlorpyrifos Management Plan Meeting PowerPoint Various meeting handouts.

Information taken from Appendix F, Sacramento Valley Water Quality Coalition Monitoring and Reporting Program: Annual Monitoring Report 2015, May 1, 2016.

3.2.3 Management Practices

Coalition Members in the Gilsizer Slough drainage are expected to continue to employ at high levels the agricultural management practices known to prevent the movement of chlorpyrifos into surface waters (see **Table** 4). Additionally, Coalition Members in the drainage will comply with the state-restricted material requirements for chlorpyrifos, and

this will also serve as an additional mechanism to instruct growers and applicators on the additional effective practices to reduce or prevent the discharge of the pesticide to surface waters. The performance goals for increased implementation of select existing management practices and enhanced education through implementation of Restricted Material Permit requirements for chlorpyrifos are provided in **Table 6**. The effectiveness of these actions implemented by growers and applicators in the Gilsizer Slough drainage will be evaluated through review of Management Plan monitoring data, evaluation of future Farm Evaluation Survey results as compared to baseline results, and Subwatershed and Sutter County Agricultural Commissioner chlorpyrifos education activities. In the event that a future exceedance of the ILRP management plan trigger limit for chlorpyrifos is observed, BYSWQC staff will use Sutter County Agricultural Commissioner's records (list of chlorpyrifos Restricted Material Permittees and NOIs) and CDPR PUR data to identify a possible source of the observed exceedance.

3.2.4 Management Plan Implementation Schedule

The Coalition's Order requires that the implementation of Management Plans and management practices result in the compliance of a constituent of concern with its applicable WQOs or trigger limits as soon as is reasonably practicable, but no longer than 10 years from submittal of the Management Plan to the Regional Water Board for approval. The Coalition Members in the Gilsizer Slough drainage anticipate that implementation of this Management Plan and its proposed management practices will result in compliance with the 0.015 µg/L WQO for chlorpyrifos within three years of submittal of the plan for approval by the Regional Water Board. The following schedule of actions is proposed for completing this Management Plan:

- November 2016: Development and submittal of Management Plan to Regional Water Board for approval.
- November 2016 – November 2019: Receive and process chlorpyrifos permit applications; Provide initial outreach and education to permit applicants; Implement new management practices required by permits; Continued implementation of existing management practices; Continued Management Plan monitoring; Annual reporting of management practice implementation;
- November 2019: If no additional exceedances are observed for chlorpyrifos during 3 years of Management Plan monitoring, then document water quality and management practices implementation and effectiveness, followed by submittal of a request to Central Valley Water Board Executive Officer for approval of completion of Management Plan.

3.3 DUTIES AND RESPONSIBILITIES

Implementation of the various elements of the Management Plan will be carried out by the Coalition and their contractors, BYSWQC staff, and Coalition Members according to the organizational chart shown in **Figure 4**. Substantial assistance will be provided by the Sutter County Agriculture Commissioner's office through issuance of Restricted Material Permits for chlorpyrifos pursuant to the pesticide's designation as a state-restricted material. The roles and responsibilities of the individuals and groups specified

in the organizational chart who will implement the various elements of this Management Plan are described below.

Sutter County Agricultural Commissioner's Office – Responsible for issuing Restricted Material Permit for chlorpyrifos; responsible for notifying permittee of pesticide use permit conditions; responsible for notifying permittee of requirement to file a NOI at least 24 hours prior to chlorpyrifos application; and responsible for reviewing the NOI and informing the permittee of additional restrictions for the application of chlorpyrifos related to weather conditions, sensitive areas, etc., as necessary.

Sample Collection Lead – Kristin Worrell, Pacific EcoRisk: Ms. Worrell will be responsible for directing the field sample collection efforts for this Management Plan.

Water Quality Data Lead – Steve Maricle, Larry Walker Associates: Mr. Maricle will have primary responsibility for processing and managing water quality data.

Quality Assurance Lead – Mike Trouchon, Larry Walker Associates: Mr. Trouchon will oversee water quality data management and has primary responsibility for quality assurance of water quality data.

Management Practice Data Lead – Claudia Street, BYSWQC: Ms. Street will provide primary oversight for collection, processing, and reporting of Farm Evaluation and management practice data.

Reporting Lead – Steve Maricle, Larry Walker Associates: Mr. Maricle will oversee preparation of the required annual Management Plan Progress Reports.

Project Lead – Program Manager for Sutter County Resource Conservation District, BYSWQC: The Program Manager will provide general oversight, review, and schedule tracking for Management Plan implementation, including coordination of needed assistance from the Sutter County Agricultural Commissioner. In the event of a future exceedance of the ILRP management plan trigger limit for chlorpyrifos, the Program Manager will review Sutter County Agricultural Commissioner's records (list of chlorpyrifos Restricted Material Permittees and NOIs) and CDPR PUR data to identify a possible source of the observed exceedance.

Education and Outreach Lead – Program Manager for Sutter County Resource Conservation District, BYSWQC: The Program Manager will be responsible for development of outreach materials, and tracking and documenting member outreach and education for the Management Plan.

Coalition Members in Represented Drainages: Coalition Members in the Gilsizer Slough drainage are responsible for continued implementation of the agricultural management practices needed to comply with WQOs, as well as complying with the requirements associated with the designation of chlorpyrifos as a state-restricted material, which includes applying for a Restricted Material Permit for chlorpyrifos from the Sutter County Agricultural Commissioner's office. Coalition Members are also responsible for providing information requested and collected by the Coalition pursuant to the implementation of this Management Plan and management practices.

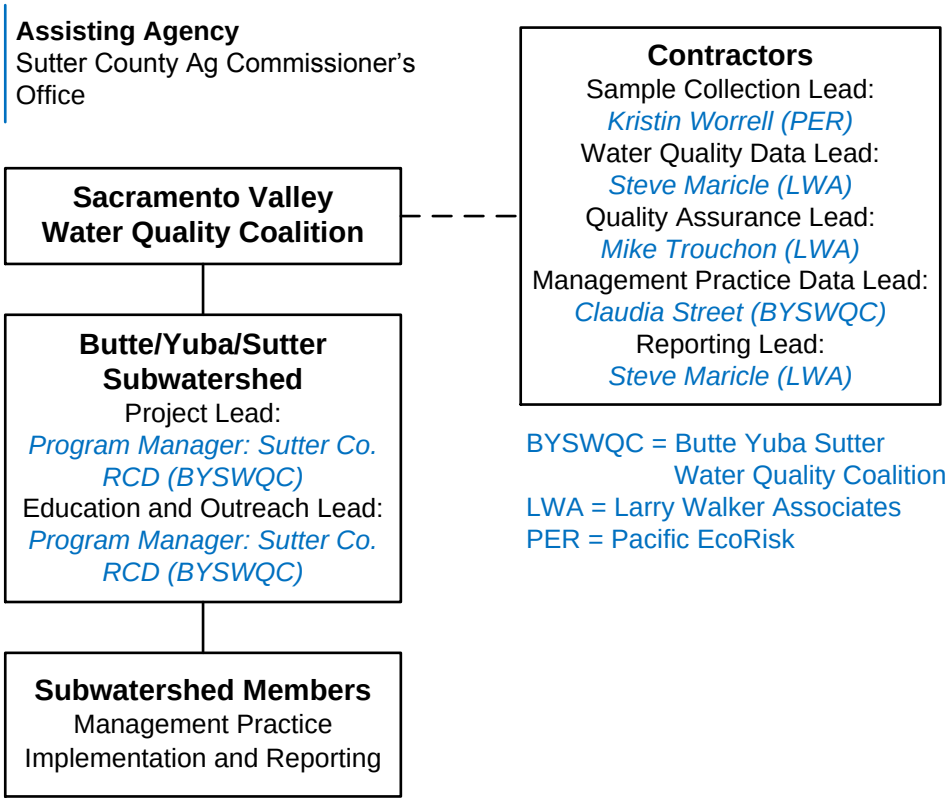


Figure 4: Gilsizer Slough Management Plan for Chlorpyrifos – Project Organization

4 Monitoring Design

Surface water quality monitoring performed in support of this Management Plan (i.e., Management Plan monitoring) is designed to measure effectiveness at achieving the goals and objectives of the Comprehensive Surface Water Quality Management Plan (CSQMP). This will be achieved by conducting Management Plan monitoring in the Gilsizer Slough drainage at the Gilsizer Slough at George Washington Blvd (GILSL) monitoring location (see **Figure 1**) that is being used by the Coalition for its Assessment Monitoring. The Coalition submitted its Annual Monitoring Plan Update for the 2017 monitoring year (October 2016 – September 2017) on October 12, 2016, and received approval by the Central Valley Water Board in November 4, 2016. The proposed monitoring for the Management Plan is part of the Annual Monitoring Plan Update submitted annually in August to the Regional Water Board for approval.

4.1 MONITORING

Management Plan monitoring in the Gilsizer Slough drainage included in the Annual Monitoring Plan Update for the 2017 monitoring year is focused on three monitoring events scheduled in the months of February, July, and August 2017. The July and

August monitoring events are based on historical peak usage of chlorpyrifos in the drainage to control insects during the walnut and almond irrigation season. Based on previously reported elevated chlorpyrifos application during these months, future monitoring is scheduled to occur during the time when chlorpyrifos use and the risk of discharges and exceedances is estimated to be highest. Sample collection and analysis for chlorpyrifos during Management Plan monitoring will be identical to that employed by the Coalition during Assessment monitoring. Monitoring results are submitted electronically to the Regional Water Board with the quarterly data submittals required by the WDR.

5 Data Evaluation

The effectiveness of this Management Plan will be evaluated through (1) review of progress made toward implementation of education and outreach activities proposed to raise awareness of water quality issues as they pertain to pesticide application, (2) assessment of agricultural management practices known to limit the transport of agriculturally-applied chlorpyrifos to surface waters, and (3) collection of surface water quality data to determine the effectiveness of management practices implementation in reducing the exceedances of the chlorpyrifos water quality objective in the Gilsizer Slough drainage. Farm Evaluation Survey data (e.g., pesticide application practices and cultural practices to manage sediment and erosion) collected in Gilsizer Slough will be used to track progress in implementing specific agricultural practices identified to reduce or eliminate the discharge of chlorpyrifos in spray drift, irrigation tailwater, and storm runoff to ambient surface waters.

5.1 EVALUATION OF MANAGEMENT PLAN EFFECTIVENESS

The effectiveness of this Management Plan primarily will be judged on improvements in surface water quality as measured in Gilsizer Slough. Fewer exceedances of the chlorpyrifos water quality objective, and fewer chlorpyrifos detections, along with documentation of the implementation of management practices described in the Actions and Task subsection, will be used to link observed surface water quality improvements to the actions of growers in the drainage. Additionally, management plan effectiveness will also be assessed with regard to the progress made toward implementation of those management actions identified to improve surface water quality in the Gilsizer Slough drainage. Status and effectiveness of this Management Plan will be described annually in the Management Plan Progress Report through presentation of the following information:

- Time series plot of chlorpyrifos data collected at the Gilsizer Slough at George Washington Blvd. (GILSL) monitoring location;
- Tabular summary of meeting annual BYSWQC outreach and education goals; and
- Tabular summary of management practices implemented under this Management Plan for comparison to baseline management practices implemented in the year prior to initiation of Management Plan activities.

6 Records and Reporting

The Coalition submits a Management Plan Progress Report (MPPR) annually on May 1 that summarizes the progress made to date on each Management Plan. The MPPR will contain the reporting components required for this Management Plan, as well as all other Management Plans. The Coalition also submits a Monitoring Plan Update report (annually on August 1) with the monitoring schedules and constituents for the upcoming monitoring year, including those required by Management Plans. These reports and schedules are consistent with the requirements in Appendix MRP-1 of the WDR.

6.1 DOCUMENTATION AND REPORTING

The water quality monitoring data collected pursuant to this Management Plan (i.e., Management Plan monitoring data) will be submitted electronically to the Central Valley Water Board on a quarterly basis along with all other monitoring data collected by the Coalition. An event-based water quality exceedances report is also provided to the Central Valley Water Board on a more or less monthly schedule. Management Plan monitoring data will be evaluated by the Water Quality Data Lead and Quality Assurance Lead (Steve Maricle and Mike Trouchon, respectively, of LWA) to ensure that data conform to the Coalition's Quality Assurance Project Plan (QAPP) and meet the requirements of the WDR. The exceedance reports and quarterly submittal of Management Plan monitoring data will provide adequate and timely information regarding compliance of ambient water quality with the chlorpyrifos water quality objective. The Subwatershed Project Lead (Program Manager: Sutter Co. RCD) will provide data on the progress toward achievement of management practices implementation and performance goals and interim milestones as set forth in this Management Plan and the Education and Outreach Lead (Program Manager: Sutter Co. RCD) will report on education and outreach efforts for inclusion in the MPPR. All required information will be summarized annually in the MPPR, along with the most recent and previous year's Management Plan monitoring data.

Appendix A: Chlorpyrifos Pesticide Use Report Data in the Gilsizer Slough Drainage

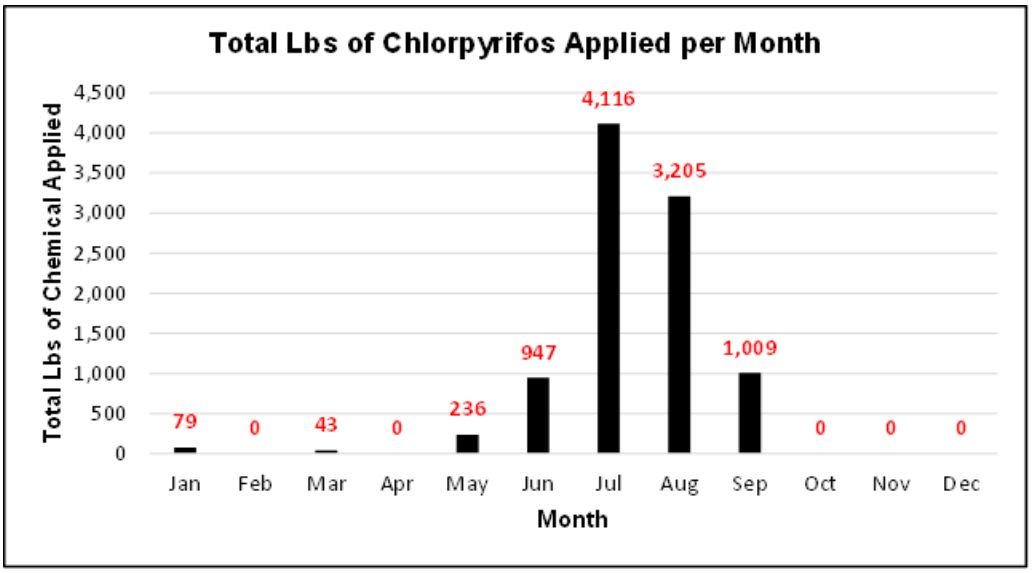


Figure A1: Pounds of chlorpyrifos applied per month in the Gilsizer Slough Drainage, 2012 – 2014.

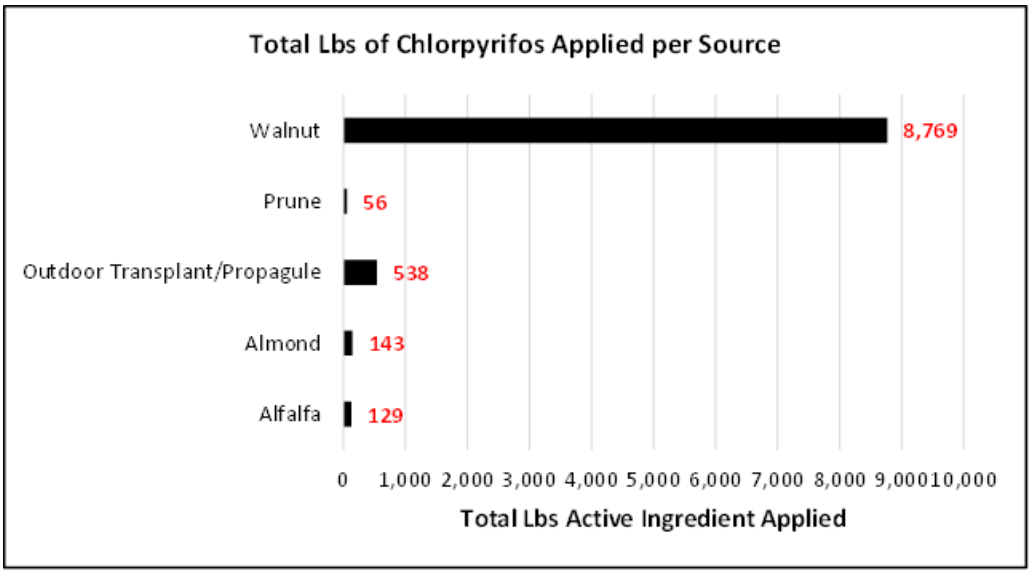


Figure A2: Agricultural chlorpyrifos applications in the Gilsizer Slough Drainage, 2012 – 2014.

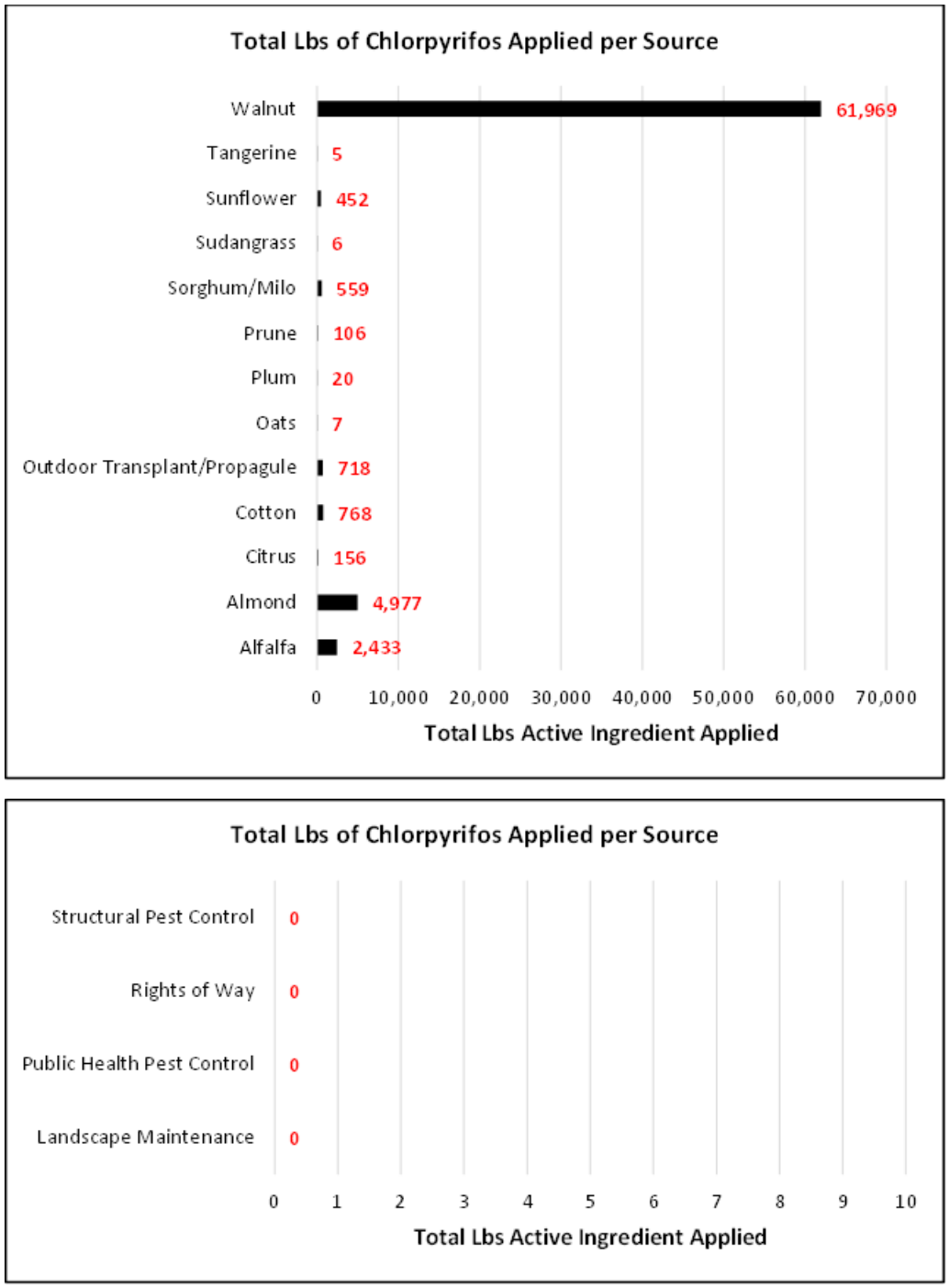


Figure A3: Irrigated agricultural and non-agricultural applications of chlorpyrifos in Sutter County, 2012 – 2014.

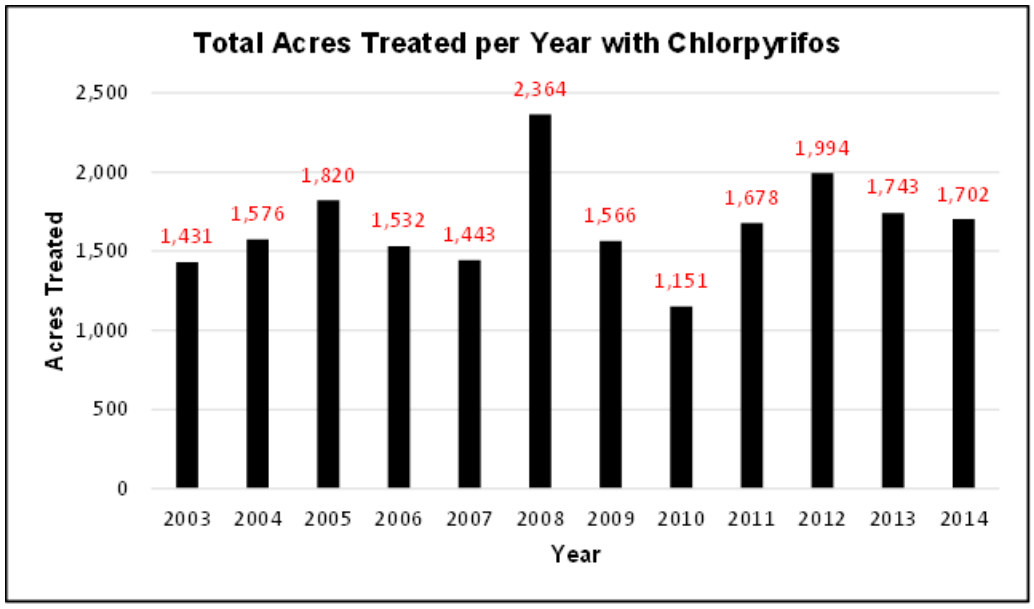
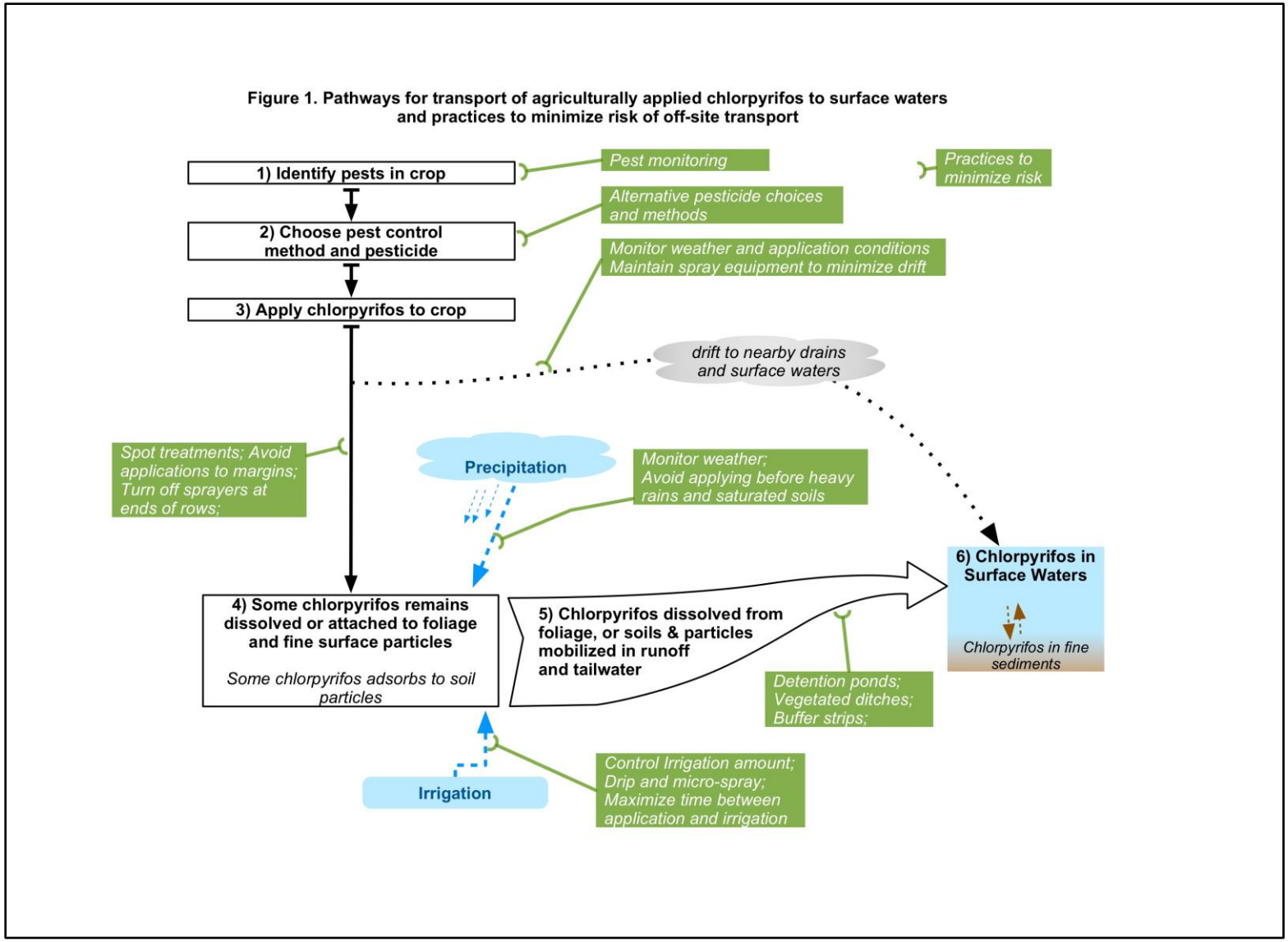


Figure A4: Acres per year treated with chlorpyrifos in the Gilsizer Slough Drainage, 2003 – 2014.

Appendix B: Pathways for Transport of Agriculturally Applied Chlorpyrifos to Surface Waters and Practices to Minimize Risk of Off-site Transport



Appendix C: Chlorpyrifos Interim Recommended Permit Conditions

Taken from California Department of Pesticide Regulation web site:

http://www.cdpr.ca.gov/docs/county/cacltrs/penfltrs/penf2015/2015atch/attach0904.pdf

Appendix O

Chlorpyrifos Interim Recommended Permit Conditions

Introduction

These are recommended permit conditions to minimize bystander exposure and offsite movement of chlorpyrifos during applications and reduce runoff after applications. These recommendations apply to products containing chlorpyrifos labeled for the production of an agricultural commodity.

Setback distances to protect bystanders

Use the following minimum application setback distances for applications adjacent to sensitive sites as defined by the label or designated by the commissioner:

Application Method	Minimum Setback Distance (fee)
Ground Boom	25
Chemigation	25
Airblast	50*
Aerial (Fixed wing or rotary)	150

* Dormant applications must comply with 3 CCR section 6960

The setback distance extends in all directions from the edge of the sensitive site to the edge of the treatment area. Setbacks are in effect only during the application.

Application conditions

1. All applications must take place with a minimum wind speed of 3 mph and not more than 10 mph as measured at a height of four feet above the ground;

Appendix O
Chlorpyrifos Interim Recommended Permit Conditions (07/15)

2. For airblast applications:

    a. Spray the outside crop row from outside in, directing the spray into the treatment area and shutting off nozzles on the side of the sprayer away from the treatment area.

    b. Shut off top nozzles when treating smaller trees, vines, or bushes to minimize spray movement above the canopy.

3. Incorporate or clean-up granules that are spilled during loading or are visible on the soil surface in turn areas.

Appendix O
Chlorpyrifos Interim Recommended Permit Conditions (07/15)